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PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Dennis P. Parazak, et al.  
Serial Number: 10/691,714  
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Title: SYSTEMS AND METHODS FOR  
PRINTING ONTO A SUBSTRATE USING  
REACTIVE INK

DECLARATION PURSUANT TO 37 C.F.R. § 1.132

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Sir:

I, Dennis P. Parazak, hereby declare the following:

1. I am the inventor of the above-identified application.
2. I am a citizen of the United States of America residing at Oceanside, California.
3. I received a Bachelors degree in Chemistry at the University of Missouri – St. Louis in 1981.
4. I received a Masters degree in Chemistry at the University of Missouri – St. Louis in 1987.
5. I received a Ph.D. degree in Chemistry at the University of Missouri – St. Louis in 1996.
6. I joined the Hewlett-Packard Company in 1996 and have been employed by Hewlett-Packard for 12 years.
7. I have read Shioya et al., Matsumoto et al. and Lavery et al. I have extensive experience and knowledge with the design and use of inkjet printheads, including those in which fixer is used. I also know which kinds of printhead nozzle

arrangements work best when reactive and ink fixer are both used. I also know about the various kinds of printheads that can be used with such a system, either having both reactive ink and fixer on the same orifice plate or on different orifice plates. With regard to the Shioya patent, it is a situation where a fixer is used along with colorants to improve the waterfastness of the printed material. With regard to the same orifice plate, there is only one out of the three figures that shows a configuration where one would consider the ink and fixer to be sharing the same orifice plate. In Figure 1, fixer (S) and inks (KCMY) are shown to be on the same orifice plate, but the fixer nozzles are arranged in such a way that minimizes or eliminates the mixing of the fixer and inks. The arrangement of the arrays of nozzles are not shown, but it would only be practical to use this arrangement if the nozzles were arranged in the following way:

First possible nozzle arrangement for Shioya Figure 1

Y                      M                      C                      S                      K

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or other arrangements with multiple rows of nozzles such as

Second possible nozzle arrangement for Shioya Figure 1

Y                      M                      C                      S                      K

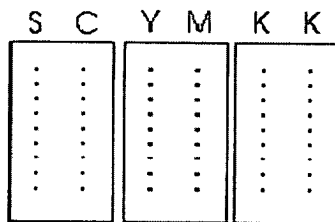
.....	.....	.....	.....	.....
.....	.....	.....	.....	.....

The above arrangements would require a very large printhead if one would meet the requirement of having hundreds of nozzles in each row of nozzles in order to have a practical printing throughput. This would be a very expensive printhead indeed to have a competitive throughput. The arrangements above would possibly prevent or discourage the mixing of fixer and inks in the nozzles, but would not be very practical.

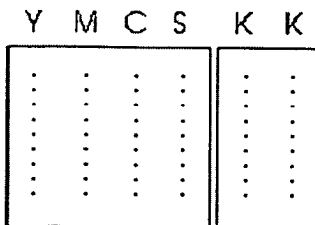
The printhead arrangement in Shioya Figure 4 is an improvement from a reliability standpoint since the mixing of fixer(s) on the orifice and in the nozzles would be minimized, but this is no longer an arrangement where the fixer and inks are on the same orifice plate. It would still be rather impractical and expensive if one wanted a competitive throughput.

The arrangement in Shioya Figure 6 is the most efficient arrangement for throughput, but the disadvantages of this system is that it requires 5 separate printheads, another rather expensive arrangement. Again, we no longer have the fixer and ink sharing the same orifice plate.

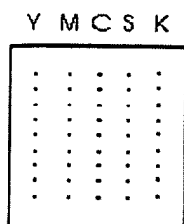
In contrast, in the embodiment of the present application, the design of the printhead allows for an ink and a fixer to share the same orifice plate, improve waterfastness and minimize the number of printheads. The example below shows one possible non-limiting example of a pen set that is less expensive than those in Shioya Figures 1, 4 and 6.



Or another arrangement where only two printheads would be needed



Or even only one



These three last non-limiting arrangements would provide a system which would be satisfactory for throughput. They would also work well with the system of the present application in which ink and fixer form solid precipitate when they come in contact, but the precipitate can be readily redispersed or redissolved. Such a system would have no need to prevent or minimize proximity of fixer and ink orifices or prevent mixing of such reactants.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under § 1001 of Title 18 of the United States Code and, that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

  
INVENTOR NAME

3/11/08  
Date